

4 a plurality of current sources connected to the summing
5 node, each current source further comprising at least one
6 transistor, and each current source supplying a current to the
7 summing node and being connected to a power supply voltage,
8 wherein the currents sources supply currents according to a
9 bandgap equation:

10

$$K_1(V_{CC} - V_T) + K_1 V_T = K_2 V_{BE} + K_3 (kT/q)$$

11 where V_{CC} is the power supply voltage, V_T is [the] a
12 predetermined threshold voltage [which defines the minimum
13 acceptable voltage of V_{CC}] of a transistor in a first current
14 source within the plurality of current sources, V_{BE} is a base
15 emitter voltage [defined by a selected transistor which comprises
16 a current source within the plurality of current sources] of a
17 transistor in a second current source within the plurality of
18 current sources, [and kT/q is equal to a thermal voltage where]
19 k is Boltzman's constant, T is [the] a temperature in kelvin of
20 a transistor in a third current source within the plurality of
21 current sources, q is [the] an electronic charge constant, and
22 K_1 , K_2 , and K_3 are constants determined by a resistance and a
23 transistor length in the first, second, and third current
24 sources, respectively; and

25 an indicator circuit having an input connected to the
26 summing node and generating a logical signal at an output,
27 responsive to voltage changes in the summing node.

1 3 4. (amended three times) A direct current sum bandgap voltage
2 comparator comprising:

3 a summing node;

4 a plurality of current sources connected to the summing
5 node, each current source further comprising at least one
6 transistor, and each current source supplying a current to the
7 summing node and being connected to a power supply voltage; and

8 an indicator circuit having an input connected to the
9 summing node and generating a logical signal at an output,
10 responsive to voltage changes in the summing node, wherein the
11 currents sources supply currents according to a bandgap equation:

12
$$K_1(V_{CC} - V_T) + K_1 V_T = K_2 V_{BE} + K_3 (kT/q)$$

13 where V_{CC} is the power supply voltage, V_T is [the] a
14 predetermined threshold voltage [which defines the minimum
15 acceptable voltage of V_{CC}] of a transistor in a first current
16 source within the plurality of current sources, V_{BE} is a base
17 emitter voltage [defined by a selected transistor which comprises
18 a current source within the plurality of current sources] of a
19 transistor in a second current source within the plurality of
20 current sources, [and kT/q is equal to a thermal voltage where]
21 k is Boltzman's constant, T is [the] a temperature in kelvin of
22 a transistor in a third current source within the plurality of
23 current sources, q is [the] an electronic charge constant, and
24 K_1 , K_2 , and K_3 are constants determined by a resistance and a
25 transistor length in the first, second, and third current
26 sources, respectively, and wherein the plurality of current
27 sources comprises four current mirrors.

1 1314. (amended three times) A zero power circuit comprising:

2 a first circuit;

3 a direct current sum bandgap voltage comparator comprising:

4 a summing node;

5 a plurality of current sources connected to the summing
6 node, each current source further comprising at least one
7 transistor, and each current source supplying a current to the
8 summing node and being connected to a power supply voltage,
9 wherein the current sources supply according to a bandgap
10 equation:

$$K_1 (V_{CC} - V_T) + K_1 V_T = K_2 V_{BE} + K_3 (kT/q)$$

11

12 where V_{CC} is the power supply voltage, V_T is [the] a
13 predetermined threshold voltage [which defines the minimum
14 acceptable voltage of V_{CC}] of a transistor in a first current
15 source within the plurality of current sources, V_{BE} is a base
16 emitter voltage [defined by a selected transistor which comprises
17 a current source within the plurality of current sources] of a
18 transistor in a second current source within the plurality of
19 current sources, [and kT/q is equal to a thermal voltage where]
20 k is Boltzman's constant, T is [the] a temperature in kelvin of
21 a transistor in a third current source within the plurality of
22 current sources, q is [the] an electronic charge constant, and
23 K_1 , K_2 , and K_3 are constants determined by a resistance and a
24 transistor length in the first, second, and third current
25 sources, respectively;

26 an indicator circuit having an input connected to the
27 summing node and generating a logical signal at an output,
28 responsive to changes in the summing node; and
29

30 a switching circuit for providing power to the first circuit
31 from a primary power supply and a secondary power supply, the
32 switching circuit being connected to the output of the indicator
33 circuit, wherein power from the primary power supply is supplied
34 to the first circuit if the logical signal indicates that the
35 power supply voltage is equal to or greater than the
36 predetermined threshold voltage and power from the secondary
37 power supply is supplied to the first circuit if the power supply
38 voltage is less than the predetermined threshold voltage.

1 14. (amended three times) A zero power circuit comprising:

2 a first circuit;

3 a direct current sum bandgap voltage comparator comprising:

32

4 a summing node;

5 a plurality of current sources connected to the summing
6 node, each current source further comprising at least one
7 transistor, and each current source supplying a current to the
8 summing node and being connected to a power supply voltage;

9 an indicator circuit having an input connected to the
10 summing node and generating a logical signal at an output,
11 responsive to changes in the summing node; and

12 a switching circuit for providing power to the first circuit
13 from a primary power supply and a secondary power supply, the
14 switching circuit being connected to the output of the indicator
15 circuit, wherein power from the primary power supply is supplied
16 to the first circuit if the logical signal indicates that the
17 power supply voltage is equal to or greater than the preselected
18 voltage and power from the secondary power supply is supplied to
19 the first circuit if the power supply voltage is less than the
20 preselected voltage, wherein the current sources supply according
21 to a bandgap equation:

$$K_1 (V_{cc} - V_T) + K_1 V_T = K_2 V_{BE} + K_3 (kT/q)$$

22
23 where V_{cc} is the power supply voltage, V_T is [the] a
24 predetermined threshold voltage [which defines the minimum
25 acceptable voltage of V_{cc}] of a transistor in a first current
source within the plurality of current sources, V_{BE} is a base
26 emitter voltage [defined by a selected transistor which comprises
27 a current source within the plurality of current sources] of a
transistor in a second current source within the plurality of
28 current sources, [and kT/q is equal to a thermal voltage where]
29 k is Boltzman's constant, T is [the] a temperature in kelvin of
30 a transistor in a third current source within the plurality of
current sources, q is [the] an electronic charge constant, and
31 K_1 , K_2 , and K_3 are constants determined by a resistance and a
32 transistor length in the first, second, and third current